

**CLAIMS**

We Claim:

1. A colloidal cupric compound of the formula (I):



where A and B are anions,

$$0 \leq x \leq 2, \text{ and}$$

$$0 \leq y \leq 2.$$

The relationship between x and y is further clarified by Equation II:

$$mx + ny = 2 \quad (\text{II})$$

where m and n are coefficients equal to oxidation numbers of the anion A and B, respectively,

the anion A representing  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{F}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{RCOO}^-$  where R is  $\text{H}$ , a  $\text{C}_1$ - $\text{C}_{20}$  straight chain or branched hydrocarbon, or an aromatic group, tartrate<sup>2-</sup>, citrate<sup>3-</sup> or an amino acid residue;

the colloidal cupric compound made by a process comprising:

purifying a  $\text{Cu}^{2+}$  solution; and

raising the pH of the solution.

2. The colloidal cupric compound of claim 1, wherein the  $\text{Cu}^{2+}$  solution is prepared from  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

3. The colloidal cupric compound of claim 1, wherein purifying the  $\text{Cu}^{2+}$  solution is performed by:

adding an oxidizing agent and  $\text{H}_3\text{PO}_4$  to the solution;

adjusting the pH to 3;

heating the solution; and

removing the solids.

4. The colloidal cupric compound of claim 3, wherein the oxidizing agent is  $\text{H}_2\text{O}_2$  or bleach.

5. The colloidal cupric compound of claim 3, wherein adjusting the pH to 3 is performed by adding  $\text{Na}_2\text{CO}_3$  solution.

6. The colloidal cupric compound of claim 1, wherein the process further comprises:

adding the solution to an organic solvent to form a precipitate; and  
collecting the precipitate.

7. The colloidal cupric compound of claim 6, wherein the organic solvent is methanol or acetone.

8. The colloidal cupric compound of claim 6, wherein the precipitate is dried by nitrogen flow.

9. A process for producing a colloidal cupric compound of the formula (I):



where A and B are anions,

$0 \leq x \leq 2$ , and

$0 \leq y \leq 2$ .

The relationship between x and y is further clarified by Equation II:

$$mx + ny = 2 \quad (\text{II})$$

where m and n are coefficients equal to oxidation numbers of the anion A and B, respectively,

the anion A representing  $\text{Cl}^-$ ,  $\text{Br}^-$ ,  $\text{I}^-$ ,  $\text{F}^-$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{PO}_4^{3-}$ ,  $\text{RCOO}^-$  where R is H, a  $\text{C}_1\text{-C}_{20}$  straight chain or branched hydrocarbon, or an aromatic group, tartrate<sup>2-</sup>, citrate<sup>3-</sup> or an amino acid residue;

the process comprising:

purifying a  $\text{Cu}^{2+}$  solution; and

raising the pH of the solution.

10. The process claim 9, wherein the  $\text{Cu}^{2+}$  solution is prepared from  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ .

11. The process of claim 9, wherein purifying the  $\text{Cu}^{2+}$  solution is performed by:

adding an oxidizing agent and  $\text{H}_3\text{PO}_4$  to the solution;

adjusting the pH to 3;

heating the solution; and

removing the solids.

12. The process of claim 11, wherein the oxidizing agent is  $\text{H}_2\text{O}_2$  or bleach.

13. The process of claim 11, wherein adjusting the pH to 3 is performed by adding  $\text{Na}_2\text{CO}_3$  solution.

14. The process claim 9, wherein the process further comprises:

adding the solution to an organic solvent to form a precipitate; and

collecting the precipitate.

15. The process of claim 14, wherein the organic solvent is methanol or acetone.

16. The process of claim 14, further comprising drying the precipitate by nitrogen flow.

17. A method of controlling fungal diseases in plants comprising the step of applying to said plants a fungicide comprising the colloidal cupric compound of claim 1.

18. A method of controlling fungal diseases in plants comprising the step of applying to said plants a fungicide made according to the process of claim 9.

19. The method of claim 17, wherein the fungicide is colloidal copper citrate.

20. The method of claim 18, wherein the fungicide is colloidal copper citrate.

21. The method of claim 17, wherein the fungicide is colloidal copper citrate solution containing about 50 mg/L copper.

22. The method of claim 18, wherein the fungicide is colloidal copper citrate solution containing about 50 mg/L copper.